CATALOGUS Euphorbiarum

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INTRODUCTION
BOISSIER'S SYSTEM
POST BOSSIER'S SYSTEM

INTRODUCTION.

Boissier's monograph of the genus Euphorbia (1862) is over 100 years old.

A great deal of new material has been collected, and a great deal of new observations have been made since: in North America, tropical Africa, The Orient, and Central Asia.

Detailed studies of portions of the genus in geographically isolated areas have been made, but no new coherent review with species listed exists.

Below are listed the most important authors who did the most important additions to our knowledge to the System of Euphorbia genus on a world-wide basis, except F. Pax, who, however, followed Boissier very closely. The greatest progress was made by N. E. Brown.

Müll. Arg. in Fl. Brasiliensis	1874
A. Berger Sukkulente Euphorbien	1907
N. E. Brown Fl. Trop. Afr., Fl. Capensis	1915
F. Pax in Natürl Pflansen Fam. 2.Ed.	1931
Degener and Croizat in Fl. Havanensis	1938
C. C. Wheeler Subgen Chamaesyce	1941
R. I. Prokhanov in Komarov's Fl. SSSR	1949
R. G. Meyer in Merxmüller's Prodromus	1967
Grady Webster, Genera of Euphorbiaceae	1967
A. R. Smith and T. G. Tutin in Fl. Europea	1968
Hurusawa - Japan	

All these authors were confined to Brasil, Africa, Succulents, Hawai, Central Asia, German W. Africa, S.E.U.S., Fl. Europea.

By retaining Boissier's System one does not retain the best system, but the system that will necessitate the least overclassification, least name multiplication and the least promotion of botanical lawyers.

The best system would be the one expressing evolution. Such system would be based on paleontology. But paleontology doesn't work in botany. A few cases of amber conserved oligocene flowers too meager to base evolutionary speculations on them. No seed magnificient paleontological evidence exists in flowering botany like the system of vertebrates can boast with.

Boissier's system embraces the whole world and is based on minute study of morphology and does not stress evolution. One can be critical of Boissier's work in detail but when it comes to replace the whole

with a better one, one gets into trouble.

I will, therefore, retain Boissier's basic concepts as a working system by inverting the new taxanomic units between the old one; by adding rather than by replacing and destroying.

Another curse on the progress of Euphorbia classification is over stressing the importance of the problem of whether or not breaking Euphorbia into smaller genera. As if it would be of any importance or not if a portion of Euphorbia should be named differently than is done by a monographer "A monographer is always right, a non-monographer's critisism is superfluous".

Boissier's words: "Genus vastissimum et naturalissinum, ideo in sectiones recte definitas difficile distribuendum" -- Still holds.

So why create new problems and break a very natural group into several unnatural ones?

It requires no scientific justification.

American authors are divided into two groups. The first group, the conservationists want to leave it in the genus; L. C. Wheeler, A. Berger, Pax, Fernald, McVaugh. The progressives want to take Chamaesyce out of Euphorbia, and leave the rest of Euphorbia into the hands of other monographers; Croizat, Millspaugh, Webster, Degener, Dinter, Burch, Hurusawa, Skinner. The difficulty to define the genus exactly is great.

Only in one respect does my work pretend completeness. It will list all validly published binominals and trinominals, and insert them numerically as "post-Boissier binominals and trinominals".

An effort will be made to discuss all new systems and relationships, and geographic groupings where practical.

Modern taxonomy (experimental, cytological, chemotaxonomy, palinology) creates an amazing field for progress, but it is still too specialized and in very narrow avenues, and too slow to get forward.

The question whether or not to break Euphorbia into smaller genera is not an important question, and now occupies many botanists' valuable time unnecessarily. It is rather the question of taste than of scientific value. If one considers it really a scientific problem, then it should be treated world-wide. By treating it locally, one simply creates new problems which one leaves unresolved to others. It is a subjective dislike to large genera.

THE BOISSIER SYSTEM
1862

I Series APPENDICULATAE						
A. Stipulatae						
I	Sect. Anisophyllum	176	1 -176	Herbae,Frutice	Orbs. veter.	
II	Sect. Zygophyllidium	4	177-180	Herbae	Amer.	
III	Sect. Cyttarospermum	5	181-205	Herbae,Frutice	Amer.	
IV	Sect. Dichilium	4	206-209	Herbae	Amer.	
V	Sect. Alectrotonum	16	210-226	Frutices	Amer.	
VI	Sect. Petaloma	2	227-229	Herbae	Amer.	
VII	Sect. Crossadenia	4	230-234	Herbae v Frutices	Amer.	
VIII	Sect. Stachidium	3	235-238	Herbae	Amer.,Carpens.	
B. Stipulae nullae						
IX	Sect. Tithymalopsis	8	238-246	Herbae	Amer.	
X	Sect. Tricherostigma	2	250-251	Frutices	Amer.	
XI	Sect. Portulacastrum	2	252-253	Herbae	Amer.	
II Series EXAPPENDICULATAE						
A. Stipulatae						
XII	Sect. Cheirolepidium	1	-254	Herbae	Tatania	
XIII	Sect. Eremophyton	2	255-257	Herb.,Frutice	Austral.	
XIV	Sect. Nummulariopsis	1	-258	Herbae	Amer.	
XV	Sect. Poinsettia	10	259-269	Herb.,Frutice	Amer.	
XVI	Sect. Arthrothamnus	10	270-280	Frutices	Cape	
XVII	Sect. Caulanthium	1	-281	Herba carnosa	India or.	
XVIII	Sect. Goniostema	7	282-289	Frutices carnosi	Madag.	
XIX	Sect. Diacanthium	33	290-323	Frutices carnosi	Madag., Arabia,India or.,Abyss.	
B. Stipulae nullae						
XX	Sect. Euphorbium	33	324-357	Frutices carnosi	Cape	
XXI	Sect. Rhizanthium	5	358-363	Herbae carnosi	Himal.	
XXII	Sect. Tirucalli	14	364-378	Frutices subcarnosi	Cape	
XXIII	Sect. Lyciopsis	1	-379	Frutex spinescens	Arab	
XXIV	Sect. Pseudacalypha	2	380-382	Frutae,Herbae parvi	Arab.	
XXV	Sect. Euphorbiastrum	1	-383	Frutex	CostaRica	
XXVI	Sect. Tithymalus	308	384-692	Herbae v Frutices non carnosi.	Toto orbe obviae.	

The Boissier System is built on 26 sections, which are of very irregular size. The first and the last one are the biggest. The 24 sections are much smaller; some of which consist of only one species.

The first section ANISOPHYLLUM has 176 species, the last one TITHYMALUS has 692 species. In between the 24 sections altogether have only 206 species, but the variation here is the biggest. Herbs, shrubs, trees, succulents and dwarf plants alternating with each other.

ANISOPHYLLUM alone consists of 8 subsections, of which one CHAMAESYCE is dominating with 94 species.

TITHYMALUS consists of 11 subsections of which the 7th ESULA is dominating with 139 species.

The original work of Boissier was published in 1862, but in 1866 a Supplementum of 29 new species was added.

Boissier did not consider the succulents from an evolutionary standpoint of importance and scattered them over several sections of which XIX DIACANTHIUM and XX EUPHORBIUM became the most important.

A great number of specialists have done special work on succulents: Pax (1897-1910), Berger (1907) and N. E. Brown (1912, 1915).

Boissier's sections: XIX DIACANTHIUM, XX EUPHORBIUM, XXII TIRUCALLI, XXI RHIZANTHIUM - are not identified separately by N. E. Brown but are absorbed in his two very excellent keys in Fl. Trop. AFR (1912) and Flora Capensis (1915)

MÜLL. ARG. SYSTEM
1874
Fl. Bras.

48 Binominals and many trinominals.
This table refers to brasilian species only and follows Boissier's system very closely.

A. Involucro praeter glandulas insuper appendices gerentia						
Sect. I	Ephedropeplus	Mull.Arg.		1	(pp.Crossadonia Bois.) E.gymnodada Bois.
Sect. II	Alectrotonum	Boiss.	1862	1	E.cotinoides Miq.
Sect. III	Anisophyllum	Roeper	1828	22	
Sect. IV	Cyttarospermum	Boiss.	1862	2	
Sect. V	Dichilium	Boiss.	1862	1	E.insulana Vell.
Sect. VI	Crossadenia	Boiss.	1862	4	
B. Involucrum appendicibus destituta					
Sect. VII	Nummulariopsis	Boiss.	1862	1	E.peperomioides Boiss
Sect. VIII	Euphorbium	Boiss.	1862	1	E.phosphorea Mart.
Sect. IX	Stachidium	Boiss.	1862	1	E.comosa Vell.
Sect. X	Poinsettia	Boiss.	1862	3	
Sect. XI	Tithymalus	Boiss.	1862	11	
				48	species.

THE BERGER, A. SYSTEM
1907

			Boissier Nos.
Sect.	1	Tithymalus	410-427
	2	Arthrothamnus	270-278
	3	Tirucalli	365-375
	4	Pteroneurae	333
	5	Diacanthium	
		1 Splendentes	290-292
		2 Grandifolia	293-296
		3 Scolopendrae	299
		4 Compressae	300-301
		5 Trigonae	302-310
		6 Poligonae	312-331
	6	Anthacantha	332-341
	7	Meleuphorbia	332
	8	Dactylanthea	328-330
	9	Medusea	322-327
	10	Pseudenphorbia	326
	11	Pseudomedus	354
	12	Treisia	342-351

F. A. PAX
1858-1942

The writer was Professor Pax's student in 1910-13 and became an Euphorbiacea specialist under his influence, but World War One interrupted his botanical activities until 1960, when he returned to botany in the New York Botanical Garden.

F. A. Pax has described many new Euphorbiae, during 1894-1910, mostly in Engler's Jahrbücher, but also scattered his descriptions in many other places. A short summary of the publication places are as follows:

Engler's Jahrbücher		1894-1910
Engler's Pflansenwelt Ostafrikas		1895
Annals Institut Botany	Rome	1895
Bull.Herb.Boissier	Geneva	1898
Preuss.Acad.Wissensch.	Berlin	1899
Bull.Mus.d'Hist.Naturelle	Paris	1902
K.K.Naturh.Hofmus.	Wien	1905
Schles.Ges.Vaterl.Kult.	Breslau	1911
Fedde Repert Beihäfte		1910
" "	"	1922
" "	"	1923
Blumea		1938

F. A. PAX SYSTEM 1931
1858-1942

Published in 2nd Edition of Die Natürl. Pflanzen Familia 19c:208, in 9 Sections.

Sect. I ANISOPHYLLUM
- Acutae
- Elegantes
- Hypericifolae
- Chamaesyceae
- Pleiadenia
- Sclerophylliae
- Gymnadenia
- Chelonae

Sect. II ADENOPETALUM
- Zygophyllidium
- Cyttarospermum
- Dichilium
- Alectoroctonum
- Petaloma
- Crossadenia
- Ephedropeplus
- Stachydium
- Tricherostigma
- Tithymalopsis
- Stachydium
- Portulacastrum

Sect.III POINSETTIA

Sect.IV EREMOPHYTON Boiss.
- Eueremophyton Pax
- Cheirolepidium Boiss.
- Holstianae Pax et.K.Hoffm.
- Pseudoacalypha Boiss.

Sect.V LYCIOPSIS

Sect.VI PSEUDEUPHORBIUM Pax 1891

Sect.VII EUPHORBIUM
- 1 Arthrothamnus Boiss.
- 2 Tirucalli Boiss.
- 3 Pteroneuvae Berger
- 4 Goniostema Baill.
- 5 Diacanthium Boiss.
  - 1.Splendentes Berger
  - 2.Grandifoliae Berger
  - 3.Scolopendriae Berger
  - 4.Compressae Berger
  - 5.Trigonae Berger
  - 6.Polygonae Berger
  - 7.Triacantae Pax
  - 8.Tetracantae Pax
- 6 Anthacantae Berger
- 7 Meleophorbiae Berger
- 8 Dactylacanthae(Haw.) Berger
- 9 Medusae (Haw.)Berger
- 10 Treisia (Haw.)Berger
- 11 Pseudomedusae Berger

Sect.VIII RHIZANTHIUM Boiss.

Sect.IX TITHYMALUS
- Tenellae Pax
- Decussatae Boiss.
- Oppositifoliae Boiss.
- Crotonopsidae Boiss.
- Ipecacuanhae Boiss.
- Laurifoliae Boiss.
- Osyridae Boiss.
- Pachycladae Boiss.
- Carunculares Boiss.
- Galarrhaei Boiss.
- Esulae Boiss.
- Myrsinitae Boiss.

Pax did not deviate much from Boissier, but accepted Berger's improvement in regard to the succulents.

N. E. BROWN

Published the most thorough key in existence, not following Boissier's System.

Published in Dyer's Fl. Trop. Afr. (1912) and Fl. Capensis (1916), I tried to show his correlations with Boissier. He is using succulents to a much more important degree than Boissier, and disregards Boissier's nomenclature completely.

In Fl. Trop. Afr. he cuts Euphorbia into two groups.

1. Plants without spine shields 99
2. Succulent plants always armed with prickle. 91

190

In Fl. Capensis he cuts Euphorbia into 4 groups.

A. Herbaceous, never succulents.....38
B. Woody shrubs..... 2
C. Shrublets..... 2
D. Succulents: These absorb Bossier's - Euphorbium, Diacanthium, Tirucalli, Rhizanthium, Caruncularas Eremophytum.... 140

180

N. E. Brown's succulents comprise Boissier's Sections:
XIX DIACANTHIUM, XX EUPHORBIUM, XVI ARTHROTHAMNUS,
XVII CAULANTHIUM, and XVIII GONIOSTEMA.
The non succulents are absorbed ANISOPHYLLUM and TITHYMALUS.

N. E. Brown's section is very well thought out. Very practical and useable by beginners. It is very carefully described. However, it is unfortunate that he used six symbols combined with unnumbered, and unsymboled items, shown only by miniature indentations make a use very cumbersom%. I have attempted to apply the well useable plain numbering system.

N. E. BROWN SYSTEM
Fl. Trop. Afr.
1912

1. Plants without spine shields (99).....Boissier nomenclature.
2 Involucres with only 2-3 perfect glands..Chamacsyce.
2 Involucres with 4-5 glands divided...Caruncularis,Euphorbium
into 3-15 processes.....Lyciopsis,Diacanthium.
2 Involucres with 4-5 glands without
appendages, pubescent.....Pseudacalypha,Euphorb.
2 Involucres with 4-5(6-8) glands globrous, never divided.
3 Herb, branches slender repeatedly forked.....Esula.
3 Herbaceous annuals or perennials, lvs. well developed.
4 Annual decumbent, opposite, white patch..Stachidium.
4 Annual or perennial, lvs. opposite.
5 Glabrous.....Anisophyllum
5 Pubescent on the upper side.....Anisophyllum
5 Pubescent all around.....Anisophyllum
Annual or perennial, lvs. alternate.
6 Involucres solitary.....Eremophyton, Esula,
Euphorbium,Carunculares
6 Involucres in terminal 3-10
raged umbels.....Galarrh., Esula.
7 Glands 2-horned.....Esula.
7 Glands entire.....Galarrh.,Eremophyton.
8 Plants 3-9 incnes high...Galarrh.
8 Plants 1-5 feet high.....Eremophyton.
8 Shrubs or trees.....Lyciopsis,Pseudacal.,
Diacanthium,
Lvs. present.....Tirucalli,Caruncul.,
Lvs. absent.....Pseudacalypha.
8 Dwarf succulent plant....Euphorbium.
1. Succulent plants always armed with prickles.(91).Diacanthium.
Involucral glands 4-5 entire and without appendages.

FLORA CAPENSIS
N. E. BROWN'S KEY.
1915

1. Herbaceous plants, never succulents nor spiney.	
2. Stems evident.	Boissier's Nomenclature
3. Lvs with white areas at the base.	Sect. VIII Stachidium 238 E. philloclada
3. None of the leaves w. white areas at the base.	
4. Woodstock not tuberous.	
5. Opposite.	
6. Blade less than 4 times longer than broad.	
7. Involucres in cymes.	Anisophyllum
8. Glands with petal-like appendages.	Eremophyton
	Pseudacalypha
8. Gland without petal-like appendages.	
5. Alternate.	Galarrhoeus, Eremophyton
9. Lvs. ovate-oblong.	Esula
9. Lvs. Linear.	
4. Perennial herbs w. tuberous woodstock.	Carunculares, Eremophyton
2. Stemless herb w. tuberous woodstock.	Rhizanthium
1. Woody shrub 5-7 ft. high.	
1. Shrublets.	Tirucalli
1. Plant distinctly succulents	
10. Plants spineless	
11. Shrubs bushily branching.	
12. Lvs alternate.	
13. Distinct tubercules.	
13. Without tubercules.	Euphorbium
14. Lvs. well developed.	
14. Lvs. often absent.	Tirucalli
12. Lvs. opposite.	Tirucalli, Arthrothamnus, Diacanthium.
15. Cymes terminal.	
15. Cymes racemously branched.	Arthrothamnus
11. Stem rootstock very much thicker than branches.	
16. Peduncules persisting.	
16. Peduncules deciduous.	
11. Plants dwarf.	
11. Very dwarf.	
10. Plants armed with hard sharp spines.	Euphorbium
17. Spines not in pairs.	
18. Stems tesselately marked.	

18. Stems w. 5-20 angles. Euphorbium
19. Spines forked. (continued)
19. Spines all entire.
17. Spines in pairs.
20. Trees.
20. Bushes or shrubs. Diacanthium

DEGENER - CROIZAT
1936
Subsec. 7. Chamaesyce
71-169

1888 Hillebr. Fl. Haw. 151.
1897 Hell. Minn. Bot. Stud.
1911 Lévl. Fedd. Rep. 10 151.
1913 Forbes Occ. Paper Bishop 38.
1936 Sherff Bot. Gar. 97:580.
1938 Sherff Revision Assn Mo.
1939 Sherff Adit. Stu. Field M 17.
1949 Sherff Occas. Broh. 20.

1936 Degener Chamaesyce (Degener, Otto)
1937 Degener-Croizat, Ch-hypericifolia
1938 Degener-Croizat Chamaesyce
1940 Degener-Croizat Ch. rocki
1946 Degener-Croizat Ch. degenerii

DEGENER-CROIZAT With good illustration - strongly supports the importance of the fact that the main stem is abortive above the level of the cotyledons.

The following authors are proponents of segregating Chamaesyce as genus:
Croizat, Dressler, Burch, Hurusawa, Skinner, Millspaugh, Webster.
The difficulty is great to define the genus exactly.

GRADY WEBSTER
1962
Subsec. 7 Chamaesyce
71-169

1962 Journal Arnold Arboratum Vol.48:422.

WEBSTER retains 3 genera: Euphorbia, Chamaesyce, Pedilanthus

GEN. EUPHORBIA
Subgen. ESULA Pers. (Subsect. THYMALUS Boissier with over 500 sp.)
Sect. Lathyris Gordon (Subs. Epurga Prokh.)

Sect. Esula Subsect. Esulae Boiss.
Subsect. Foweospermae Hurusawa
Sect. Tithymalus
Subsect. Purburatae Prokh.
Subsect. Inundatae Webster
Subgen. AGALOMA (Raf.) Hons (to be drastically recast.)
Sect. Tithymalopsis
Subsect. Corollatae Webster
Subsect. Ipecacuanae
Sect. Zygophyllidium Boiss.
Sect. Petaloma Boiss.
Subgen. POINSETTIA
Subgen. EUPHORBIA (400 succulent)
Sect. Euphorbia (Diacanthium Boiss.)
Sect. Anthacantha (Euphorbium Boiss.)
Sect. Aphyllis Welt & Berth (Subtr. Tirucalli Boiss.)

GEN. CHAMAESYCE

GEN. PEDILANTHUS Poitean.

WEBSTER treats Chamaesyce as an independent genus and specializes in S. E. United States, subdividing the genus into 3 Series.

Series Peploides Webster 1967 including 12 unlisted sp.
" Frostratas Webster 1969 including 50 unnamed sp.
" Adenoptera Webster including 7 unnamed sp.
" unnamed series including the following 4 limestone endemics:

158-A	E.deltoidea	Engelm.ex Chapm.	Boiss. 72-81
158-B	E.garberi	Engelm.ex Chapm.	Boiss.114-153
158-E	E.pinetorum	(Small) Jabl.	Boiss.160-166
20-A	E.porteriana	(Small) Jabl.	

P. G. MEYER
1967
Published in Merxmüller's Prodromus.

MEYER enumerates his descriptions in alphabetical order. To get his ideas of the system one has to reassemble his order in his key, where he follows more or less N. E. Brown's ideas.

1. Herbs, shrubs without succulent basis.
2. Cymes w. one gland — cyatophora Murray
2. Cymes w. 4 glands
3. Capsule w. fingerform hair — glanduligera Pax
3. Capsule different
4. Lvs with white basis — phylloclada Boiss.
4. Lvs without white basis

5. Lvs. oppotite	
5. Lvs. alternate	
1. Not a herb, nor shrub	
2. Cactuslike	transvaalensis
	guerichiana
	currori
	conspicua
	subsalsa
	virosa
	nenenata
	avasmontana
	hottentota
2. Succulent but not cactuslike	
3. Lvs opposite	verruculosa
	angrae
	juttae
	spartaria
	cibdela
	spinea
	decussata
	chersina
3. Lvs. alternate	
4. Glands without toothlike margin	gariepina
	hamata
	dregeana
	mauritanica
	gummifera
	gregaria
4. Glands with 2-7 teeth	lignosa
	namaquensis
	monteiri
	pseudoduseimata
	rudis
	fusca
	baliola
	namibensis
	friederichiae

PROKHANOV SYSTEM 1949

Subgenus PARALIAS (Raf.) Prokh. 1949 (1-148)	
Sect. 1 Sclerocyathium Prokh.	1
Sect. 2 Holophyllum Prokh. 1933	
Ser. Rupestris Prokh.	2-10
Ser. Blepharophyllae Prokh.	11-14
Sect. 3 Tulocarpa (Raf. 1833) Prokh. 1949	
Subsec. 1. Lutescentes Prokh. 1949	15-40
2. Purpuratae Prokh. 1949	41-51
3. Helioscopiae	52
Sect. 4 Chylogala Prokh.	
Subsec. 1. Tibetica Prokh. 1949	53-58
2. Caruncularés Boiss. 1862	59-60
Sect. 5 Murtekias (Raf.) Prokh.1949	
Subsec. 1. Paralioidea Prokh. 1949	61
Subsec. 2. Coniocarpae	
Ser. Seguierianae	62-66
Ser. Nicaeénses	67-71
Subsec. 3. Myrsinitae Boiss.	
Ser. Biglandulosae	72-73
Ser. Myrsinitae	74-79
Ser. Denticulatae Prokh. 1949	80
Sect. 6 Esulae	
Subsec. 1. Esulae Prokh. 1949	
Ser. 1. Andrachnoides Prokh. 1949	81-85
Ser. 2. Esulae	86-96
Ser. 3. Lucidae	97-104
Ser. 4. Virgatae	105-117
Subsec. 2. Sieboldianae	118-119
Subsec. 3. Patellares	120-123
Sect. 7 Herpetorrhiza 1933	124-126
Sect. 8 Cymatosperma 1933	
Subsec. 1. Oleraceae Prokh. 1949	127-136
Subsec. 2. Oppositifoliae Boiss. 1862	137-145
Subsec. 3. Densiusculae Prokh. 1949	146
Sect. 9 Demetra (Raf.) Prokh.	147
Sect.10 Epurga	148
Subgenus CYSTIDOSPERMUM Prokh. 1933	149
Subgenus CHAMAESYCE (Gray) Wheeler	150-159

Subgenus PARALIAS (Raf.) Prokh. 1949

Sect. 1 Sclerocyathium Prokh.

1. E.sclerocyathium E.Kor.et M.Pop. 1927 376A Caspian.

Sect. 2 Holophyllum Prokh. 1933

Ser. Rupestris Prokh.

2.	serawschanica	Rgl.	1882	446B	AsiaCent.
3.	monocyathium	Prokh.	1930	446C	AsiaCent.
4.	rosularis	A.Theod.	1941	446F	AsiaCent.
5.	tianshanica	Prokh.	1930	446D	AsiaCent.
6.	prokhanovii	M.Pop.	1938	446E	AsiaCent.
7.	rupestris	C.A.Mey.ex Ldb.	1830	446	Siberia
8.	mongolica	Prokh.	1930	446G	Far East
9.	pallasii	Turcz.	1852	445	Siberia
10.	komaroviana	Prokh.	1949	446A	Far East

Ser. Blepharophyllae Prokh.

11.	rapulum	Kar.et Kir.	1842	448	AsiaCent.
12.	blepharophylla	C.A.Mey.ex Ldb.	1833	447	AsiaCent.
13.	ferganensis	B.Fedtsch.	1916	447A	AsiaCent.
14.	lipskyi	Prokh.	1933	447B	AsiaCent.

Sect. 3 Tulocarpa (Raf. 1833) Prokh. 1949

Subsec. 1. Lutescentes Prokh. 1949

15.	scripta	Somm.et Lev.	1892	490A	W.Kaukas.
16.	squamosa	Willd.	1799	490	Kaukasus
17.	macrocarpa	Boiss.et Buhse	1860	491	Kaukasus
18.	transoxana	Prokh.	1930	491B	TianShan.
19.	mucronulata	Prokh.	1930	491	Sir.Dar.
20.	kudrjaschevii	(Pazij 1848)Prokh.	1949	491C	Pam.Al.
21.	orientalis	Linn.	1753	478	S.Transk.
22.	palustris	Linn.	1753	476	Eur.,Russ.
23.	eugeniae	Prokh.	1949	476A	W.Transk.
24.	carpatica	Woloszsz	1892	456B	E.Carpat.
25.	tauricola	Prokh.	1949	456C	Krym.
26.	villosa	W. et Kit.	1802	454A	Eur.,Russ.
27.	semivillosa	Prokh.	1933	434	Eur.,Russ.
28.	aristata	Schmalh.	1892	434A	Kaukasus
29.	soongarica	Boiss.	1860	477	Transvol.
30.	lamprocarpa	Prokh.	1933	477A	Pribalk.
31.	pilosa	Linn.	1753	454	W.Siberia
32.	polychroma	Kern.	1875	494	Cent.Eur.
33.	carniolica	Jacq.	1778	507	Cent.Eur.
34.	stricta	Linn. Syst. Nat.	1759	526	Europe
35.	platyphylla	Linn.	1753	525	S.Russia
36.	microsphaera	Boiss.	1846	463	Talysh.
37.	coniosperma	Boiss.& Buhse	1860	529	S.Transk.
38.	alpina	C.A.Mey.	1830	483	W.Siberia
39.	macrorrhiza	C.A.Mey.	1830	487	W.Siberia
40.	buchtormencis	C.A.Mey.	1830	484	W.Siberia

Subsec. 2. Purpuratae Prokh. 1949

41.	pubescens	Vahl.	1791	530	Mediter.
42.	alatavica	Boiss.	1860	485	TianShan.
43.	lucorum	Rupr.ex Maxim.	1859	473	Far East

44. condylocarpa	M.B.	1808	497	Kaukasus
45. wittmanni	Boiss.	1860	451	S.Transk.
46. pachyrrhiza	Kar.& Kir.	1841	486	TianShan.
47. talastavica	Prokh.	1933	486A	TianShan.
48. dulcis	Linn.	1753	503	Europe
49. angulata	Jacq.	1788	504	C.Europe
50. altaica	C.A.Mey.ex Ldb.	1830	506	W.Siberia
51. eriophora	Boiss.	1844	460	S.Transk.
Subsec. 3. Helioscopiae				
52. helioscopia	Linn.	1753	539	Europe
Sect. 4 Chylogala Prokh.				
Subsec. 1. Tibetica Prokh. 1949				
53. tibetica	Boiss.	1862	444	TianShan.
54. tranzschetii	Prokh.	1933	444A	TianShan.
55. bungei	Boiss.	1863	450	Iran
56. schugnanica	B.Fedtsch.	1916	450A	Pam.Al.
57. turkestanica	Rgl.	1882	450B	Pribalk.
58. alaica	Prokh.	1933	450C	Pam.Al.
Subsec. 2. Carunculares Boiss. 1862				
59. ispahanica	Boiss.	1846	434A	Kaukasus
60. grossheimii	Prokh.	1930	434B	S.Transk.
Sect. 5 Murtekias (Raf.) Prokh. 1949				
Subsec. 1. Paralioidea Prokh. 1949				
61. paralias	Linn.	1753	660	Kaukasus
Subsec. 2. Coniocarpae				
Ser. Seguierianae				
62. petrophila	C.A.Mey.	1850	595	Kaukasus
63. sequieriana	Neck.	1770	658	Kaukasus
64. humilis	C.A.Mey.ex Ldb.	1830	607	N.Siberia
65. kopetdaghi	Prokh.	1933	658A	Aralo-Cas.
66. sogdiana	M.Pop.	1923	658B	Pam.Al.
Ser. Nicaeenses				
67. macroclada	Boiss.	1840	657	Kaukasus
68. stepposa	Zoz	1949	656C	Kaukasus
69. glareosa	Pall.	1808	656	Krim.
70. volgensis	Krysht.	1929	656B	Wolgo-Don
71. goldei	Prokh.	1949	656A	Krim.
Subsec. 3. Myrsinitae Boiss.				
Ser. Biglandulosae				
72. biglandulosa	Desf.	1808	692	Krim.
73. monostyla	Prokh.	1949	691A	Iran,Turk.
Ser. Myrsinitae				
74. spinidens	Bornm.ex Prokh.	1933	688A	Pam.Al.
75. myrsinites	Linn.	1753	686	Krim.
76. pontica	Prokh.	1949	691B	Kaukasus
77. woronowii	Grossh.	1916	691A	Krim.
78. marschalliana	Boiss.	1846	691	Talisch.
79. armena	Prokh.	1949	691C	Kaukasus
Ser. Denticulatae Prokh. 1949				
80. denticulata	Lam.	1786	688	Kaukasus

Sect. 6 Esulae
Subsec. 1. Esulae Prokh. 1949
Ser. 1. Andrachnoides Prokh. 1949

81. buschiana	Grossh.	1940	614B	Kaukasus
82. undulata	Bieb.	1808	632	Volgo-Don
83. irgisensis	Litw.	1922	639B	Aralo-Cas.
84. andrachnoides	Schrenk.	1844	639A	W.Siberia
85. buhsei	Boiss.	1862	659	Iran

Ser. 2. Esulae

86. esula	Linn.	1753	637	Dnieper.
87. microcarpa	Prokh.	1933	634B	W.Siberia
88. subtilis	Prokh.	1941	634A	Dnieper.
89. gmelini	Steud.	1840	634	Volgo-Don
90. discolor	Ldb.	1849	186	Siberia
91. karoi	Freyn.	1896	186A	E.Siberia
92. borszczowii	Prokh.	1949	186B	Volgo.
93. sareptana	Beck	1858	631	Volgo-Don
94. latifolia	C.A.Mey.	1830	638	W.Siberia
95. borodini	Sambuk	1928	638A	Volgo-Don
96. poecilophyla	Prokh.	1933	642	Pam.Al.

Ser. 3. Lucidae

97. salicifolia	Host.	1797	642	Europe
98. glomerulans	Prokh.	1933	642A	TianShan
99. agraria	M.Bieb.	1808	647	Bessar.
100. severzowii	Herd.	1933	646A	TianShan
101. mandshurica	Maxim.	1884	646B	Manchuria
102. lucida	W.et Kit.	1802	646	Upper Dni.
103. iberica	Boiss.	1860	645	Kaukasus
104. pseudagraria	P.Smirn.	1940	645A	W.Siberia

Ser. 4. Virgatae

105. uralensis	Fisch.	1822	634B	Volgo-Don
106. pamirica	Prokh.	1933	634C	Pam.Al.
107. cyparisias	Linn.	1753	636	Upper Dni.
108. astrachanica	C.A.Mey.ex Claus.	1851	630B	Lower Vol.
109. tshuiensis	(Prokh.)	1880	639A	W.Siberia
110. cyrtophylla	Prokh.	1930	630A	Pam.Al.
111. gurtensis	Prokh.	1933	634D	Pam.Al.
112. leptocaula	Boiss.	1862	630	Russia
113. virgata	W.et Kit.	1805	634	Moravia
114. boissieriana	(Woron.) Prokh.	1931	634G	Kaukasus
115. jaxartica	Prokh.	1933	634H	Cent.Asia
116. zhiguliensis	Prokh.	1941	634J	Volgo-Don.
117. subcordata	C.A.Mey.	1830	639	W.Siberia

Subsec. 2. Sieboldianae

118. sieboldiana	Mork.et Decne	1836	627	Japan
119. savaryi	Kiss.	1921	504A	Far East

Subsec. 3. Patellares

120. amygdaloides	Linn.	1753	673	Upper Dni.
121. glaberrima	C.Koch.	1848	675	Iberia
122. oblongifolia	C.Koch.	1848	673	Kaukasus
123. macroceras	Fisch.,Mey.	1837	676	Iberia

Sect. 7 Herpetorrhiza Prokh. 1933					
124. aucheri	Boiss.	1846	612B	Iran	
125. deltobracteata	Prokh.	1933	612C	Turcmen.	
126. polytimetica	Prokh.	1933	612D	Pam.Al.	
Sect. 8 Cymatospermum Prokh. 1933					
Subsec. 1. Oleracea Prokh. 1949					
127. aleppica	Linn.	1753	547	Krim.	
128. exigua	Linn.	1753	549	Baltic	
129. graeca	Boiss.et Sprun.	1844	571	Krim.	
130. lederbourii	Boiss.	1860	561	Krim.	
131. peplus	Linn.	1753	556	Upper Dni.	
132. aulacosperma	Boiss.	1853	554	Kaukasus	
133. falcata	Linn.	1753	552	Europe	
134. acuminata	Lam.	1786	557	Kaukasus	
135. normanni	Schmalh.	1892	552B	Kaukasus	
136. francheti	B.Fedtsch.	1916	552A	TianShan	
Subsec. 2. Oppositifoliae Boiss. 1862					
137. inderiensis	Less.et Kar.et Kir.	1842	385	Dziung.	
138. triodonta	Prokh.	1930	858A	Pam.Al.	
139. sororia	Schrenk.	1845	387	Pribalk.	
140. azerbaidzhanica	Bordz.	1928	389A	Kaukasus	
141. consanguinea	Schrenk.	1841	389	Midl.Asia	
142. turczaninowii	Kar.et Kir.	1842	388	E.Kaukas.	
143. arvalis	Boiss.et Heldr.	1853	567	Iran,Asia M.	
144. densa	Schrenk.	1845	386	Aralo-Casp.	
145. szovitsii	Fisch.et Mey.	1835	566	Iran	
Subsec. 3. Densiusculae Prokh. 1949					
146. densiuscula	Pop.et Mey.	1923	566B	Midl.Asia	
Sect. 9 Demetra (Raf. 1840) Prokh.					
147. lanata	Sieber	1828	309	Medit.	
Sect. 10 Epurga Prokh. 1949					
148. lathyris	Linn.	1753	384	Kaukasus	
Subgenus CYSTIDOSPERMUM Prokh. 1940					
149. cheirolepis	Fisch.et Mey.	1849-51	254	Aralo-Casp.	
Subgenus CHAMAESYCE (Gray) Wheeler					
150. nutans	Lagasca	1816	52	N.Amer.	
151. indica	Lam.	1786	49	Afr.,Ind.	
152. peplis	Linn.	1753	71	Zakaukas	
153. humifusa	Willd.	1813	82	Asia,W.Sib.	
154. chamaesyce	Linn.	1753	101	Asia minor	
155. canescens	Linn.	1753	101B	S.Zakau.	
156. turcomanica	Boiss.	1760	100	Aralo-Casp.	
157. anisopetala	Prokh.	1930	100A	Asia Cent.	
158. forskalii	Gay. J.	1836	102	N.Afr.	
159. maculata	Linn.	1753	52	Atl.Europe	

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System of Smith, A. R. and Tutin, T. E.

Subgen. Chamaesyce Rafin.	1-7	
Subgen. Esula Pers.		
Sect. Pachycladae(Boiss.)Tutin	8-9	Insulares
Sect. Carunculares(Boiss.)Tutin	-10	
Sect. Helioscopia Dumort.	11-56	Galarrhoes Boiss.
Sect. Myrsinitae(Boiss.)Tutin	57-59	
Sect. Lathyris Dumort.	-60	Decussatae
Sect. Cymatospermum(Prokh.)Prokh.	61-69	Seeds ornamented
Sect. Paralias Dumort.	70-94	Lvs palmately veined
Sect. Esula (sensustricta)	95-105	Lvs pinnetely veined

SEE - B. C. J. DUMORTIER, Florula Belgica, Operis majoris Prodromus, Staminacia Tornaci Nerviorum. 1827.